

FIGURE 1

**COMMERCIAL
PROCESS**

3 EB Ta Ingot
12" Dia. 3476 lbs



Machine Clean



Heat 600° F



Rotary Forge 4"



Machine Clean



Saw Cut Billet



Anneal 1050° C



Test

EXTRUSION PROCESS

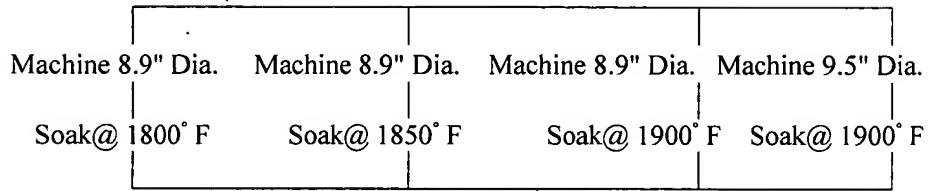
3 EB Ta Ingot
10" Dia. 3734 lbs



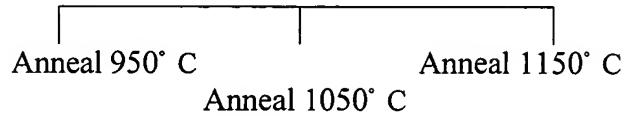
Machine Clean



Saw Cut into 4 Billets



Extrude 4" Dia.



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Test

COMMERICAL PROCESS

PROCESS	SAMPLE LOCATION	950°C ANNEAL X 2 HOURS		
		Average Grain Size (µm)	Grain Size Range	Recrystallize (Percent)
Commercial Process	Center			
Commercial Process	Edge			
9.5"Ø, Extrude 1800°C	Center	46	<10-240	95
9.5"Ø, Extrude 1800°C	Edge	40	<10-250	99
9.5"Ø, Extrude 1850°C	Center	33	<10-240	80
9.5"Ø, Extrude 1850°C	Edge	35	10-290	65
9.5"Ø, Extrude 1900°C	Center	33	10-180	50
9.5"Ø, Extrude 1900°C	Edge	35	<10-225	98
10.25"Ø, Extrude 1900°C	Center	32	10-110	65
10.25"Ø, Extrude 1900°C	Edge	28	<10-200	85

FIGURE 2(A)

PROCESS	1050°C ANNEAL X 2 HOURS			1150°C ANNEAL X 2 HOURS		
	Average Grain Size (µm)	Grain Size Range	Recrystallize (Percent)	Average Grain Size (µm)	Grain Size Range	Recrystallize (Percent)
Commercial Process	60	20-245	76			
Commercial Process	60	10-155	100			
9.5"Ø, Extrude 1800°C	45	10-150	95	60	10-150	100
9.5"Ø, Extrude 1800°C	35	10-135	100	75	10-200	100
9.5"Ø, Extrude 1850°C	65	<10-110	100	75	10-110	100
9.5"Ø, Extrude 1850°C	63	<10-110	100	62	10-145	100
9.5"Ø, Extrude 1900°C	32	10-180	100	86	10-145	100
9.5"Ø, Extrude 1900°C	32	<10-90	99	122	10-135	100
10.25"Ø, Extrude 1900°C	35	10-80	99	56	10-135	100
10.25"Ø, Extrude 1900°C	38	<10-110	100	70	10-160	100

FIGURE 2(B)

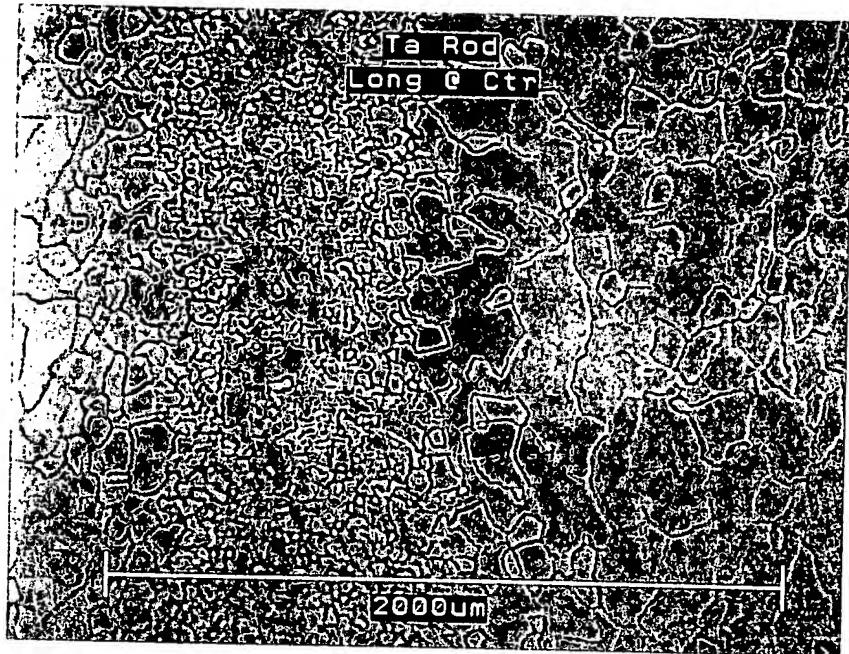


FIGURE 3(A)

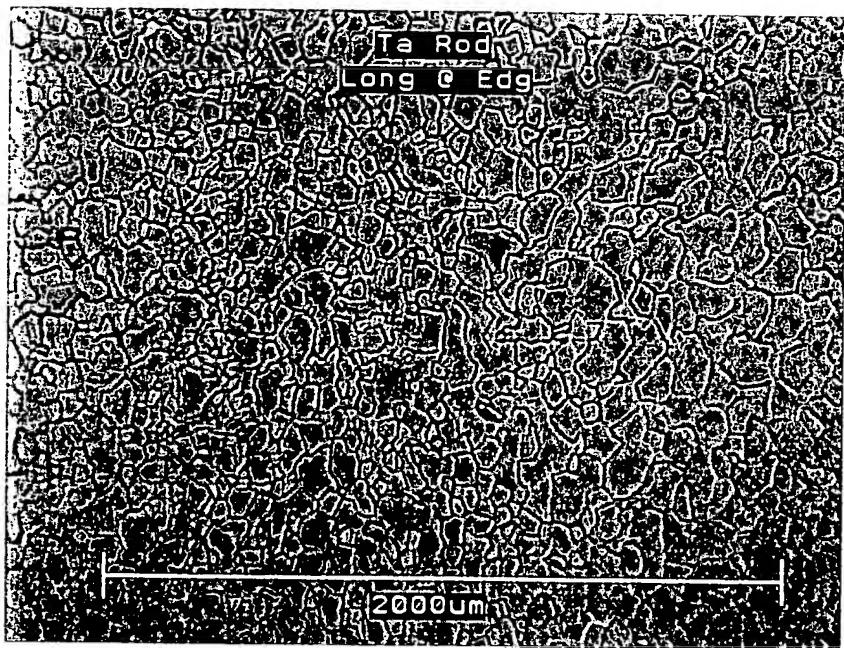


FIGURE 3(B)



FIGURE 4(A)

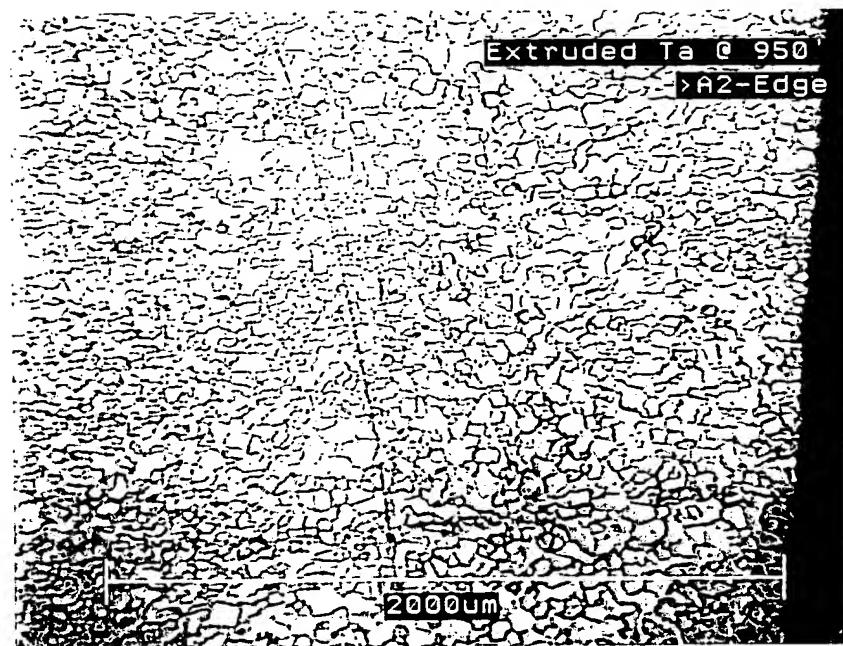


FIGURE 4(B)

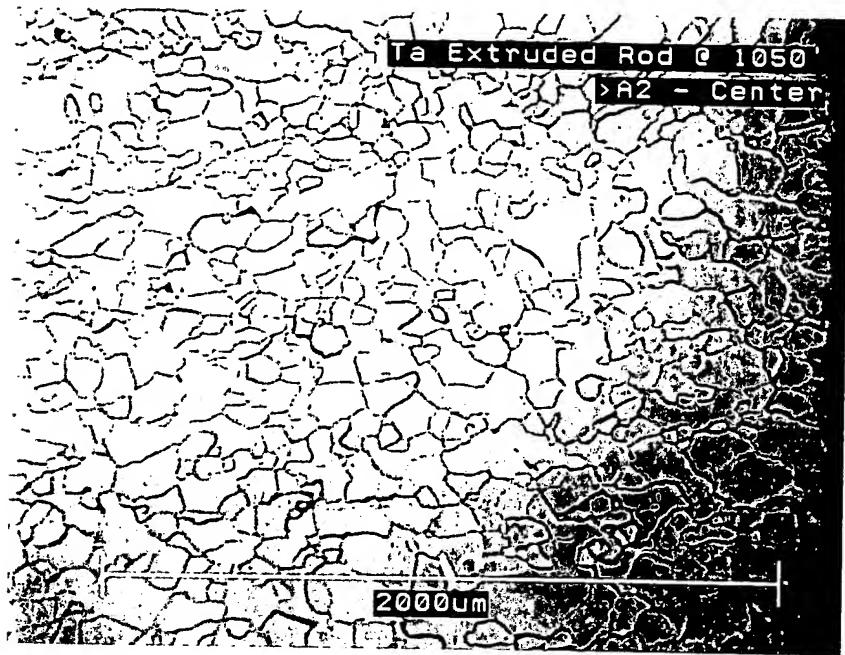


FIGURE 5(A)



FIGURE 5(B)

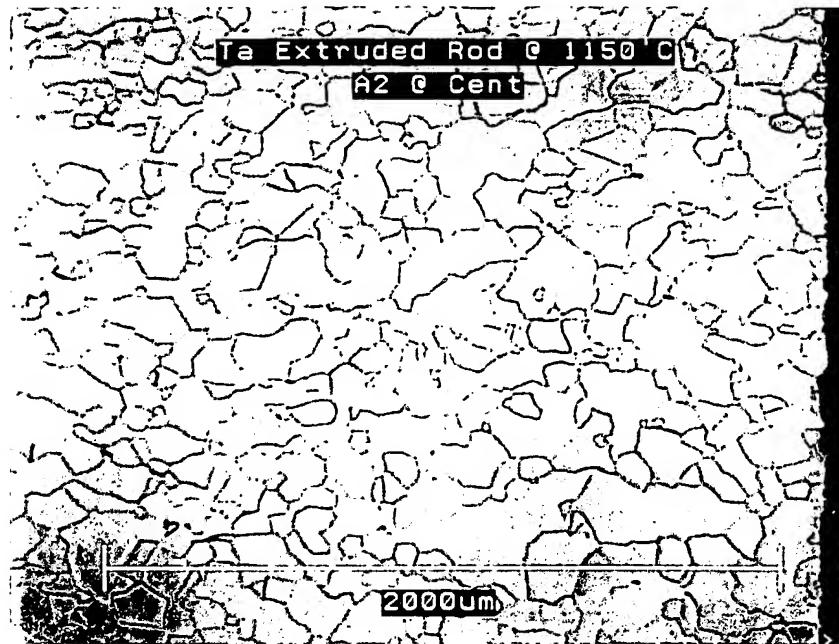


FIGURE 6(A)

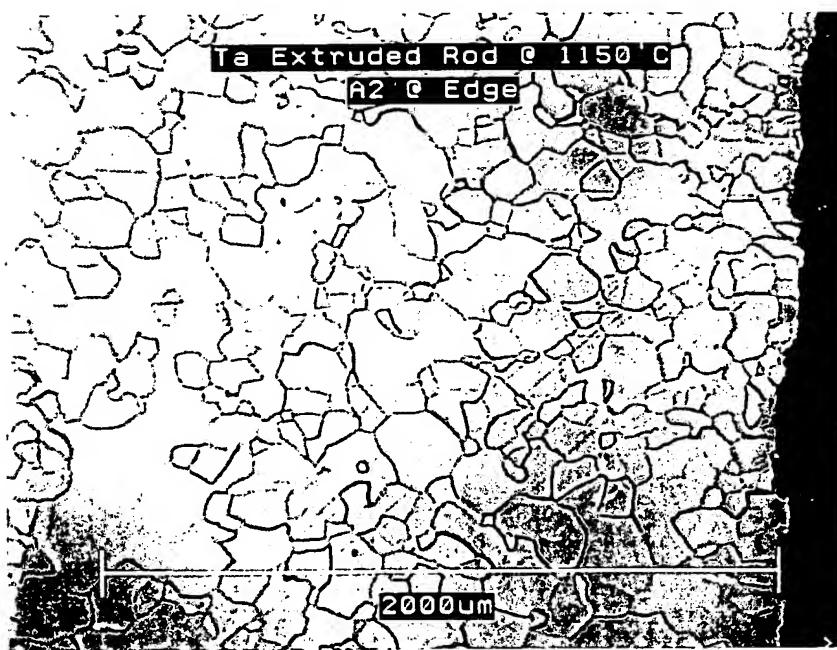


FIGURE 6(B)

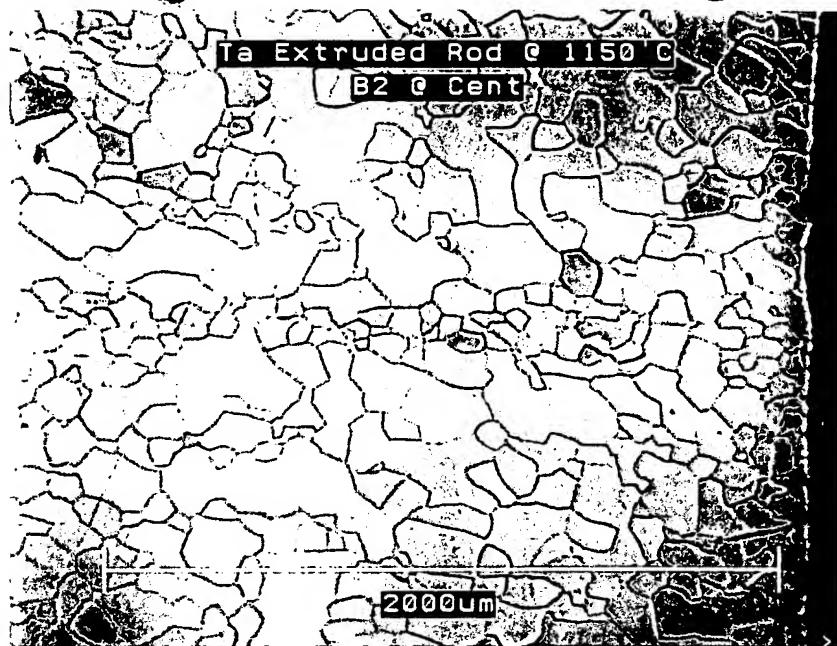


FIGURE 7(A)

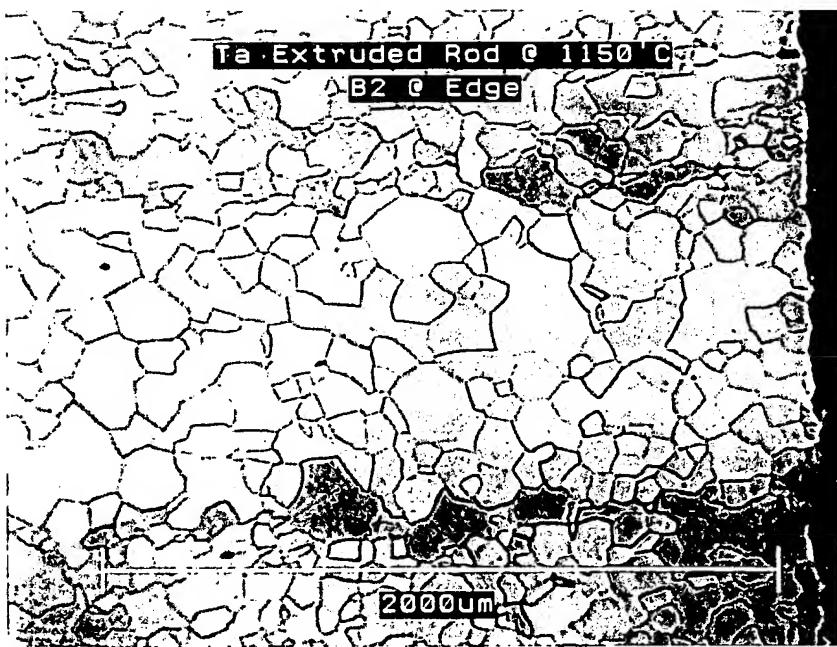


FIGURE 7(B)

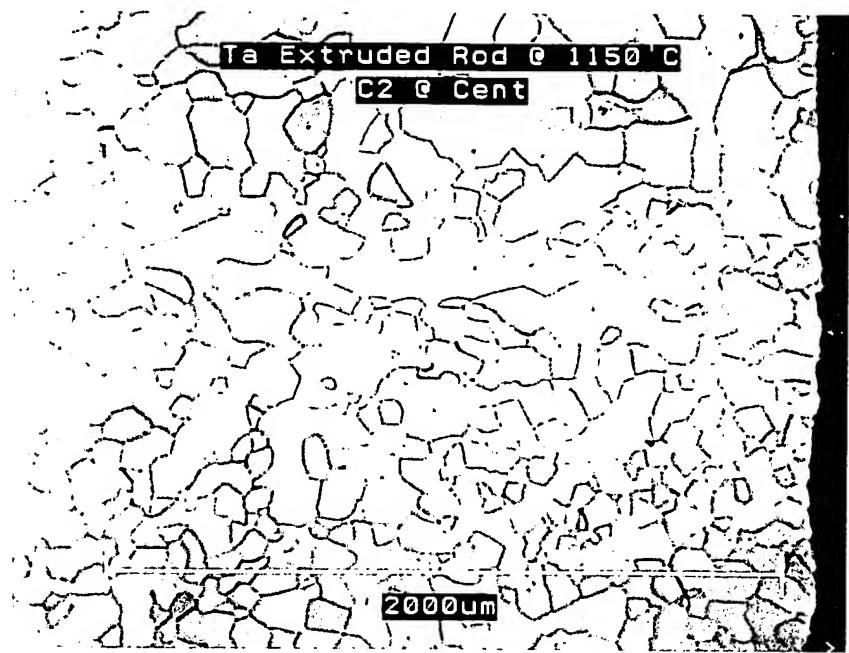


FIGURE 8(A)

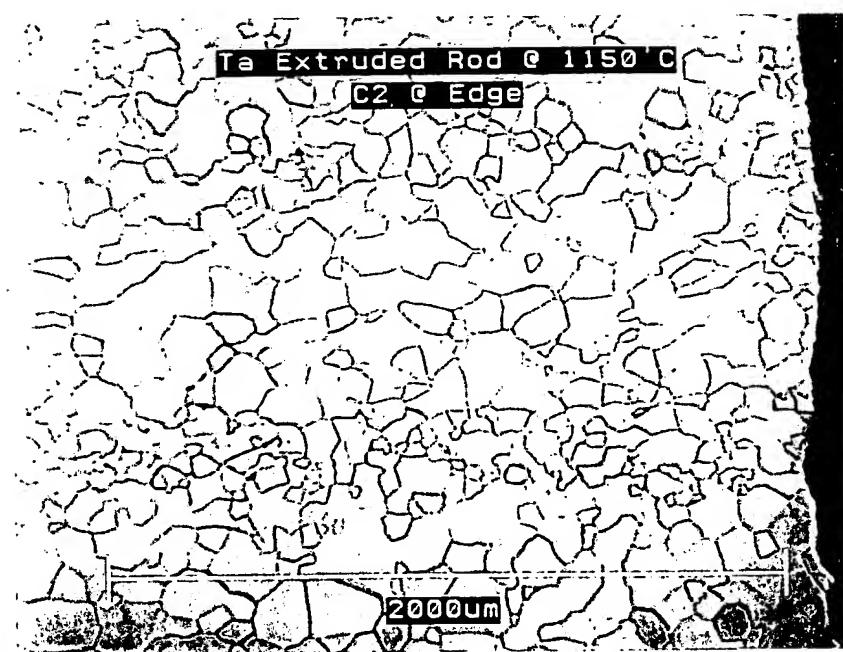


FIGURE 8(B)

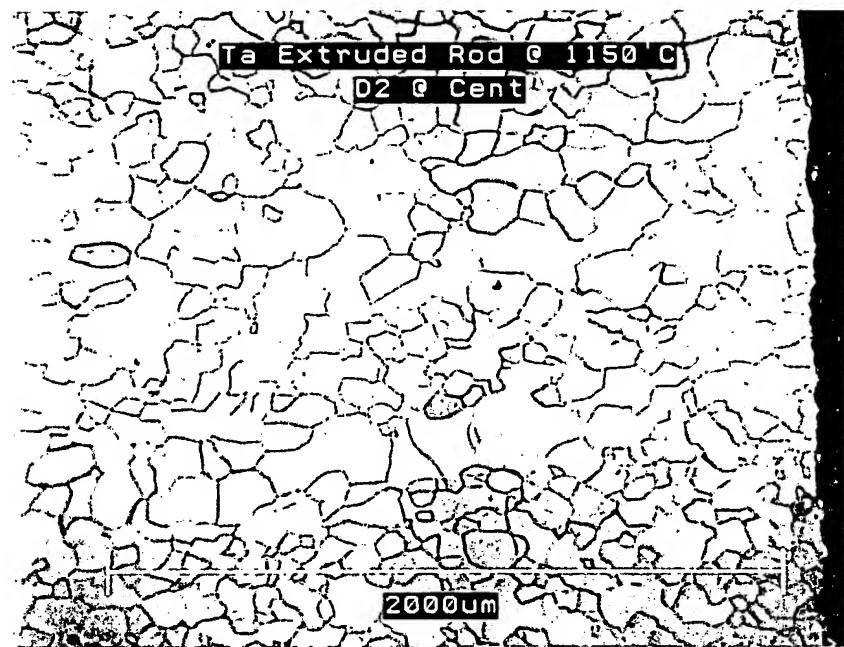


FIGURE 9(A)



FIGURE 9(B)